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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/766,777	01/27/2004	Masaki Matsushita	60710 (70904)	8288

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EXAMINER	
VO, ANH T N	

ART UNIT	PAPER NUMBER
2861	

DATE MAILED: 05/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/766,777	MATSUSHITA ET AL.	
	Examiner	Art Unit	
	Anh T.N. Vo	2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

FINAL REJECTION

Claim Rejections - 35 USC § 112

Claims 1-4 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Correction or clarification is required.

In claim 1, it is unclear what the S/N ratio of the detection signal is, how it can be "produced" and how this S/N ratio can be "satisfied".

The remaining claims are dependent from claim 1 therefore also considered indefinite.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior arts are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 10, 13-14 and 16-17 are rejected under 35 USC 103 (a) as being unpatentable over Sugimoto et al (US 5,565,899) in view of Nagasaki et al. (US Pat. 6,036,305).

Sugimoto et al discloses in Figures 20-22 an ink jet recording apparatus comprising:

- an ink storage section (1100 or 1000) for storing ink therein;
- an ink supplying path (1600a) for supplying the ink stored in the ink storage section to a print head (400a);
- an electrode (700b) for detecting whether the ink is present or absent in the ink supplying path (1600a) (column 21, lines 50-56) to generate a detection signal;

- a first filter (700a) and second filter (700a) in the ink supplying path (1600a), the first and second filters having different filtration accuracies, the first filter (700a) located upstream to the second filter (700), the second filter (700) has a larger filtration accuracy than the first filter (700a); and
- an amount of the ink supplied into the ink supplying path being .08cc (column 19, lines 17-18);
- wherein the filter has a mesh shape (column 19, line 35).

However, Sugimoto et al. does not disclose that an amount of the ink supplied into the ink supplying path per minute is such that a predetermined S/N ratio of a detection signal produced by the electrode is satisfied, a filter in the ink supplying path has a water-repelling property and an amount of the ink supplied into the ink supplying path is 1.0cc.

Nagasaki et al. teach in Figures 9-11 an ink cartridge comprising a filter (64) in the ink supplying path (63) having a water-repelling property (column 9, lines 14-15).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the teaching of Nagasaki et al. in the Sugimoto et al. ink jet apparatus for the purpose of facilitating the removal of air bubbles from a filter at a minimum level (column 10, lines 1-5).

Although Sugimoto et al does not specify the S/N ratio of the detection signal; however, a skilled artisan realizes that S/N ratio is the ratio between the gain of the detection signal provided by the electrode and the noise level generated from the ink flow within the ink path. In order to detect the present/absent of ink and process the detection signal, the S/N ratio of this signal should be equal or greater than a predetermined ratio which is set by selecting the gain of the detection signal or adjusting the ink flow. Thus, adjusting the amount of ink (ink flow) for providing a predetermined S/N ratio as claimed is considered to be a matter of a design expedient for an engineer depending upon the gain of the electrode and the size and shape of the cartridge. It would have been obvious to a person having skill in the art at the time the invention was made to adjust the ink flow of Sugimoto et al as claimed for the purpose accommodating with the gain

of electrode and the size and shape of the ink cartridge so that an optimum detection signal would be generated.

Also, it is noted that selecting "an optimum amount of the ink supplied into the ink supplying path being 1.0cc." instead of "an amount of the ink supplied into the ink supplying path being .08cc" as recited in the Sugimoto et al. reference" is considered to be a matter of a design expedient for one of ordinary skill in the art for the purpose of controlling ink flow rate at the ink supplying path. Also, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable range involves only routine skill in the art. *In re Aller*, 105 USPQ 233

Response to applicant's Arguments

The applicant argues that Sigimoto et al fails to suggest that the second filter (700) has a larger filtration accuracy than the first filter (700a). The argument is not persuasive because the second filter (700a) as shown in Figure 20 of Sigimoto is placed down stream from the first filter (700) to further filter out particles passing through the first filter. Thus, the second filter must have larger filtration accuracy than the first filter (700).

The applicant argues that Sigimoto et al fails to suggest that the amount of ink supplied into the ink supplying path per minute is such that a predetermined S/N ratio of a detection signal produced by the electrode is satisfied. The argument is not persuasive because adjusting the amount of ink (ink flow) for providing a predetermined S/N ratio as claimed for the purpose of accommodating with the gain of the electrode and the size and shape of the cartridge is considered to be a matter of a design expedient for an engineer depending upon the gain of the electrode and the size and shape of the cartridge that would have been obvious to a person having skill in the art at the time of the invention because weak detection signal would be buried under noise so that it cannot be processed by microprocessor or the present/absent of ink cannot be detected by the electrode.

Allowable Subject Matter

Claims 4 and 15 would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. This claim would be allowable because none of the prior art references of record discloses an image forming apparatus satisfying:

$$n.N.R.B > 2.\gamma.h,$$

where n (N/m) is a surface tension of the ink, N(cells/m) is a cell density of the ink absorbing body before contained in the ink storage section, R is a compression ratio that is a ratio between a volume of the ink absorbing body after contained in the ink storage section, and a volume of the ink absorbing body before contained in the ink storage section, γ is a specific gravity of the ink, h (m) is a maximum water head of the ink in a perpendicular direction with respect to an ink supply outlet of the ink storage section under arbitrary orientation, and B is a coefficient = 4.08 x 10 in the combination as claimed.

Claims 5-9 are allowable. These claims would be allowable because none of the prior art references of record discloses an image forming apparatus satisfying:

$$(4.Q/(\pi d))/v \leq 2,$$

where v(m /s) is a dynamic viscosity of the ink, d(m) is a diameter of the ink supplying path, Q (m /s) is an average ink supply amount.

Claim 11 would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. This claim would be allowable because none of the prior art references of record discloses an image forming apparatus satisfying:

$$F1 < F2 \leq 2F1,$$

where F1(m) is a filtration accuracy of the first filter, and F2(m) is a filtration accuracy of the second filter in the combination as claimed.

Claim 12 would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. This claim would be allowable because none of the prior art references of record discloses an image forming apparatus satisfying:

$$F1 < F2 \leq DB,$$

where F1(m) is a filtration accuracy of the first filter, and F2(m) is a filtration accuracy of the second filter, and DB(m) is a diameter of an air bubble created when an air bubble created in the ink supplying path passes through the first filter in the combination as claimed.

CONCLUSION

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Anh Vo whose telephone number is (571) 272-2262. The examiner can normally be reached on Tuesday to Friday from 9:00 A.M.to 7:00 P.M..

The fax number of this Group 2861 is (571) 273-8300.

ANH T.N. VO
PRIMARY EXAMINER

May 9, 2006